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ABSTRACT

Theories and descriptions of various infant fear behaviors are presented in this paper. Five examples of fear are given: (1) learned fear, in which the infant associates some unpleasant action with an agent, (2) unlearned fear, in which the infant experiences an intense sensory phenomena such as a loud noise, (3) stranger anxiety, (4) fear caused by a violation of the infant's expectancy, and (5) the child's fear of the loss of its mother. No specific behaviors have been found which are characteristic only of fear. Patterns of infant behavior can be interpreted as fear within the situational context in which the behavior occurs. Problems in the measurement of fear behavior, such as individual variability, the interpretation of stimulus meaning to infants, and the effect of prior experience are discussed. It is theorized that an infant's affective response is the result of a complex process involving the organism's status, cognition plans, and strategies, as well as the stimulus properties and the context of the situation. (BRT)

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The Meaning of Fear*

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One of the difficulties in discussing complex topics such as fear is the inability to study the problem from a broad perspective. Too often we talk of fear as a concept implying a multidimensional construction and proceed to study only small aspects of the phenomenon. By doing so (applying only a reductionist position) we generate both data and theory which are incomplete and often contradictory. What I should like to try and do is to look at all the exemplars of that phenomenon we usually call fear. I hope by this method to be able to generate a taxonomy, albeit a simple one, of the phenomenon and thereby construct the basis for a theory or theories of fear. At the least, such a discussion will force us to conceptualize the construct of fear from a broad perspective.

To understand the theme of this discussion, it is necessary that I present you with five different examples of the phenomenon usually called fear.

1. A 10-month-old infant and its mother sit in their pediatrician's office. It is their turn to see the doctor. As they enter the room, the child stares at the doctor and his white coat, screams, turns away, and clutches its mother.

This first example appears to be the case of learned fear. The infant has experienced some unpleasant action the agent of which was the doctor. On the last visit two months earlier, for example, the infant may

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have received an injection and by its behavior may have indicated it was hurt. Now, two months later, we see that the child remembers or associates the previous noxious event with the current situation. The reaction to the present situation is affected by the past event, thus we might consider this example to be a case of conditioned or learned fear. Moreover, we might imagine that such fear could generalize to another situation--that is, whenever the infant is taken to an office where there are men in white coats it becomes fearful. Parenthetically, many infant researchers soon learn to remove laboratory jackets for this reason. Learned fear and its generalization must surely account for a large portion of children's fearful behavior.

2. A 1-month-old infant is lying in its crib looking at the mobile above it. Suddenly a loud bang sounds behind the crib. The infant startles, throwing out its limbs, and starts to cry.

In this second example the infant experiences an intense, sudden and unexpected change in the level of energy reaching its sensory system. Without question, stimulus events having these three elements seem to be capable of eliciting behavior commonly considered fearful. It should not be surprising that the nervous system of the young (or for any age for that matter) is designed to respond to such stimuli as noxious. Thus it would be reasonable to consider the class of events that produces unlearned fearful behavior. It would seem to us that such events probably account for a relatively small percentage of fearful responses; however, since events become increasingly associated with other events with increasing age, examples of unlearned fear may be found only in the very young.

3. An 8-month-old infant is being walked in the park with its mother. A stranger walks over to the infant, bends over the stroller and says, "What a pretty baby." The mother smiles. The infant freezes and stops playing with its rattle; then the infant turns toward its mother, back to the stranger, and starts to whimper.

This third example has most commonly been called stranger fear or anxiety. In this situation the child becomes frightened of new people and shows positive behavior toward its caregiver. The development of this pattern of behavior usually occurs after an initial period in which the infant exhibits positive behavior toward all social experiences. Thus at an earlier age this stranger may have evoked a smile and coo. This phenomenon has been likened to imprinting and as such it has been considered to be a biologically derived response. Alternatively it has been considered to be a manifestation of the child's cognitive ability in comparing the various social events (people) to an internal representation of its caregivers. Most researchers have thought of it as an index of the infant's attachment toward its primary caregiver, since it represents a discriminably different response toward various adults in its world. Why these discriminably different actions to various adults should take the form of a fearful response is not easily explained. It is tempting to postulate some conditioned or learned fear response. For example, the appearance of a stranger--say, the arrival of a baby sitter--may be associated with the loss of the mother. Alternatively, although even less plausible, is the possibility that the infant has a schema of its familiar caregivers only, and violation of that schema by the appearance of a stranger elicits fear. An analogy might be made with neurophysiology

where the concept of grandmother cell has gained some prominence as an example of cell response specificity. In a similar manner we might postulate that the mother schema or its violation automatically and specifically elicits fearful behavior. One might believe that the stranger in this example could produce interest (or arousal), but why the stranger causes fearful behavior is not clear. Violation of expectancy elicits arousal or interest, not negative affect itself. (This point, a rather important one, will be returned to later.)

4. A 7-month-old infant is sitting in its mother's bedroom. In the bathroom its mother is dressing for the evening and puts on her new long-haired wig. As she steps into the bedroom, the infant stares at her and suddenly begins to cry.

In this example we see a clear case of violation of expectancy. The child has formed a schema of its mother. This includes the integration of the stimulus properties of this person. The sudden and unexpected change in this schema results in interest or arousal. The resulting affective response can occur from the infant's inability to assimilate and accommodate its schema to this new event. Alternatively, one might argue that the infant, failing to perceive in this "new" mother its "old" mother, thereby is confronted with the loss of its "old" mother. This loss itself, whether through a conditioning or innate mechanism, is fear inducing. As in the previous example, we see the effect of novelty as an elicitor of interest, the specific affect being determined by some alternative process or cognition.

5. A year-old infant is playing in a sand box in the park. Its mother is standing close by. As he glances up from the sand he sees her walking away. He begins to call "Mommy, mommy" and starts moving toward her.

This final example involves the child's fear of the loss of its mother. It is clear that in the primates the loss of the primary caregiver increases the probability of death. Thus it is extremely important for the infant to help regulate and control the physical distance between itself and its mother. This regulation, which is performed by both members of the dyad, consists of a wide variety of behaviors. Initially, due to the infant's helplessness, the mother is the most active regulator. However, she is by no means the only one. Through crying, eye contact, and smiling the infant also helps regulate this distance. As the infant matures and is able to both leave and follow, it becomes increasingly capable of assuming a major role in the regulation of the distance between them. Thus we see attempts at both movement toward the mother and signaling for her return as she leaves. For the species as a whole, we can justify calling this behavior fearful because it is biologically useful; but unless we wish to postulate some innate releasing mechanism, we must again rely on cognitions having to do with past experience. Such cognition must rely on the distancing of the mother as being associated with painful events.

Unfortunately, although the separation from the mother has been one of the most studied problems, it is still poorly understood. In a recent study (1974, 1975), Marsha Weinraub and I have shown beautifully that for 2-year-old infants (1) there is relatively little relationship between departure--the mother going--and separation--the mother not being there; thus there appear to be two separate and distinct situations, and (2) while separation behavior is related to other mother-infant behavior, most notably cognitive activities, departure behavior is unrelated to any of the behaviors studied. This seems to agree with parental reports that the child's upset at the parent's leaving bears little relationship to the child's behavior once the parent has gone!

As one can see these examples are quite different, but they can be characterized by an affective response in the infant which most of us would readily label fear. Even though we have little trouble with the label of fear, it becomes evident that the boundaries of what we mean by fearful are not at all clear. This is rather surprising because it is a widely used term thought to convey a plethora of meanings. The issue, however, is not simple. Fear, like all affective responses, is not itself available for study. Since it is an experience of the individual, it cannot be experienced by another. Nor for that matter, since infants are nonverbal organisms, is it available through the verbal report of the subject.

What do we mean when we say that the infant is fearful? We mean that there exists a set of behaviors in a particular context that we use to infer that the infant feels fearful. All one can claim is that "If I did this [set of behaviors] when this occurred [context including stimulus] I would feel fearful." Since it is epistemologically impossible to know whether the infant is fearful, we must be willing to settle for the statement "acting as if he is fearful." Notice that we have signified that both a set of behaviors and a particular context are necessary for this statement, "I think the infant is fearful." This requirement is particularly important because neither the behaviors independent of the context nor the context independent of the behaviors will help us define the infant's affective state. Crying at a funeral or crying at the unexpected appearance of a loved one cannot lead us to assume the same internal state, although in both cases crying behavior occurs. Likewise, in considering reunion with the mother, the same context does not always suggest happiness, since one infant may be happy whereas another becomes angry at the mother's reappearance.

Our brief discussion indicates that the meaning of fear must give way to a taxonomy of context and of behavior, merged in a matrix of interaction. In the following disucssion we will approach each aspect separately, highlighting some specific issues either to be raised as problems for future research or as topics that are currently being studied. Following this we will return to theories of fear.

The Meaning of Behavior

The issue of the meaning of a response is not new to our inquiry (Lewis, 1967). A review of the literature on fear in infants (or for that matter in adults) indicates that no single behavior acts as a necessary and sufficient reference for fear. Even crying, perhaps the most likely candidate, fails to meet this requirement. A given stimulus may initially evoke smiling and laughter, yet with repeated presentations it may evoke crying. Indeed, the same stimuli may at different moments produce either pattern in a given infant. Similarly, neither approaching nor withdrawing, looking toward or looking away, reaching for or holding back, among many other possibilities, offers us the simple, operationally defined distinctions we seek. From such an analysis it would appear that the pattern of integrated response elements, not the individual elements themselves, should be studied. These patterns may differ between classes of individuals, between members of a class, and even within the same individual at different times. Genetic and ontogenetic factors, cognitive and motor capacities, prior life experiences, as well as antecedent events, will all serve to alter the structure of these response patterns in a given individual.

The ontogenetic differences are particularly salient since the capacities that are critical for the expression of fear themselves vary with age. For example, how can withdrawal serve as a measure of fear in a child too young

to move about? Is eye aversion an index of fear in the prelocomotive child but only distraction or disinterest in the toddler? In short, does a given behavior maintain its relationship to the fear construct, or is a more fluid combination of behaviors required?

Since single behavioral responses may not reflect the affective state we call fear, some investigators have turned to postulating a fear system in the infant--that is, a uniquely organized set of responses integrated within the nervous system and functionally independent of other such systems in terms of the stimuli that elicit it and the neural structures that subsume it. Unfortunately, this system approach has its own pitfalls and we may be no better off by the assumption of a system than we are by the selection of a single response measure. For example, behaviors usually identified as reflecting positive, affiliative (cf. attachment) responses to a stimulus may be evidenced simultaneously with, or in temporal proximity to, the fear system (see Bretherton & Ainsworth, 1974). In some of the data to be presented we found that strangers evoke both smiling and prolonged gaze interspersed with aversion and lip quivering or even crying.

Before turning to discussions of stimulus or context meaning, another issue in the measurement of fear needs to be undertaken. In an attempt to delineate degrees of fearfulness, as well as mitigate the fact that little actual fear is observed in experiments designed to produce fearful behavior, the term "wariness" or "sobering" has come into use (Rheingold & Eckerman, 1973). The problem of the measurement of wariness is probably a good example of the kinds of difficulty that befall the investigation of fearful behavior. It has been widely recognized that the appearance and approach of the new, or the loss

of the familiar, result in an inhibition of ongoing activity and attentive behavior such as eye gaze, heart rate changes, etc., often referred to as a general state of alerting or arousal. If one calls that set of behaviors "wariness," one has already biased the response as a negative affective behavior. One could consider this set of behaviors as a general arousal state preparatory to any number of responses, some of which might be positive or negative in affective tone. Clearly these two alternatives have different theoretical and practical implications. In labeling the set of behaviors, care must be taken not to prejudice the nature of the response.

This measurement of behavior problem can be exemplified by a study conducted by Jeanne Brooks and myself. In this study, over 40 infants, ranging in age from 7 to 18 months, watched a variety of social objects approach one at a time. These social objects included two 4-year-old children, two strange adults, and a midget who had the same facial configuration as the adults and the same height as the two children (a more complete description can be found in Brooks & Lewis, 1975). A wide range of behaviors were simultaneously scored through the use of videotapes of the children's faces taken during the approach of the social objects.

Of particular concern is the rather small percentage of subjects who show any type of affective tone. While the behavior to these three classes of social objects differed, the percentage of subjects accounting for affective tone differences was rather small. In all cases, the measures characteristically subsumed under the study of attention are the most dominant and pervasive of all. As we shall shortly discuss, the most predominant response of children at the approach of a wide variety of social objects is to stop their ongoing behavior, orient toward the oncoming stimulus, attending to the face of the social object. At the same time and for only a small number of subjects can one

find those responses usually characterized in terms of their affectual tone. In this particular study, the adult strangers received more frowning than smiling, while the children received more smiling than frowning. Finally, the midget received no smiling and relatively little frowning. The most impressive difference between these social objects was not their affectual tone differences, but rather in terms of gaze aversion behavior. The adults elicited a large percentage of gaze aversion, children little gaze aversion and the midget almost none. In fact, the response to the midget can be characterized by intense concentration and orientation with almost no affectual response. To call a response to any of these social objects wariness is to miss the crucial point, namely that the approach of a strange social object is attention-eliciting and producing and that the nature of the affectual tone is either not consistent or it is dependent upon specific characteristics of those social objects and the cognitive structure of the infant itself.

Problems in Stimulus Meaning

Regardless of the measurements employed or the labels applied, our understanding of the nature of fear responses and their antecedents depends on our ability to specify the stimulus conditions within which our assessments are made. Two dimensions of the stimulus configuration with which the infant is confronted must be considered: the physical properties of the central stimulus and the contextual cues provided by prior events and current conditions.

In terms of the physical characteristics of specific stimuli, particularly social stimuli, the studies to date describe relatively few dimensions. In a series of studies in our laboratory, we have been able to show that children appear to show less frowning and more smiling to strange children than they do to strange adults (Lewis & Brooks, 1974). In an attempt to explicate whether

facial configuration, height or both play a role in this differential response, the midget study previously described was initiated. The results of that study, while confirming the different responses to strange adults and strange children, was not able to shed light on the facial configuration-height relationship since the differential response to the midget indicated that children by 7 months were able to take both dimensions to account when assessing the social stimulus.

The approach of a stranger literature also suggests sex differences with male strangers eliciting more fear than females (Benjamin, 1961; Greenberg, Hillman & Grice, 1973; Morgan & Ricciuti, 1969; Shaffran & Décarie, 1973). Because height was a factor in those studies showing sex differences (the males were always taller than the females) it is not possible to determine whether gender per se is a factor in fear eliciting stimuli. However, in two studies from our laboratory where height was controlled between the adult male and female, no sex differences were found. Finally, Weinraub and Lewis'(1974) demonstration that the method of departure affects the child's response also provides evidence for situational and stimulus effects. Thus it becomes clear that stimulus characteristics and contextual circumstances be they gender, age or familiarity, are all necessary in assessing children's fearful responses.

A final point has to do with the issue of repeated exposure. Sroufe and his colleagues have shown that infants demonstrate changing responses to the same stimulus. Thus, the effects of particular types of prior experience may be expected to change the infant's behavior. Even on the most limited time scale, the temporal and ordinal sequencing of stimulus events must be carefully controlled in order to understand the infant's response.

In all these considerations of stimulus factors, both the more specific as well as the contextual cues, it is necessary for us to consider a taxonomy

of situation. Unfortunately, this is no easy task. Unless, however, we are prepared to seriously entertain such an enterprise, the study of affectual behavior, be it fear or any other specific emotion, will remain ephemeral.

General Theoretical Considerations

Recall that we started this discussion by mentioning the various types of situations that occur in an infant's life that an observer would be willing to call fearful. Let us now reconsider our original examples, attempting to summarize some of the general theoretical systems proposed for the eliciting of fear. It should be noted that these may have a more general use in describing other affective responses.

At least in infancy it is reasonable to discuss the possibility that there exists a series of events having innate biological capacity to elicit fearful behaviors. Such events having intense, sudden, and unexpected qualities (a loud sound) as well as more complex stimulus arrangements such as the departure of a familiar object (the mother) may be related to some innate releasing mechanism built into the organism and designed for survival value. Thus there may exist predetermined responses or response systems associated with specific events. While this may be true for a certain small number of conditions, it cannot account for most of the existing data.

Although not usually considered in the fear literature, a large proportion of fear-producing events are learned. The conditioned fear paradigm in which a conditioned stimulus is paired with an unconditioned one to produce a conditioned response is one likely mechanism to account for learned behavior. Fearful reactions to the doctor as a consequence of the painful examination or injection might be an example of this phenomenon. Furthermore, it is possible to include the mother's departure in this example, since

her departure may have been associated with her absence, itself a painful experience. The animal literature is replete with demonstrations of conditioned fear.

Although sadly lacking in most theoretical discussions, it is necessary for us to concern ourselves with the infant's cognitive capacity. The exhibition of fearful behavior may be a function of the growing capacity to form plans, evoke memory and to anticipate outcome. Such a view of the organism would propose that these developing skills enable the child to remember and anticipate potentially fearful outcomes. Explication of the cognitive skills necessary to support such a structure are as yet undeveloped, but such skills as increased memory, object permanence, etc., must underlie such a capacity.

For either a conditioned fear or a cognitive learning position, it is the familiarity of the event that causes a fearful response--that is, the presence of the "learned" fearful event in the organism's schema. Thus although insufficient attention has been given to the formation of such fears during normal development in most infants, it is clear that learning and cognition account for a significant amount of fear-producing events.

Discrepancy, incongruity, and violation of expectancy are all similar constructs and are treated as similar in order to offer still a third explanation. The discrepancy hypothesis offers a counter view since it is the absence of a schema which affords the possibility for fear-producing events. When an event is perceived as discrepant, it results in a state of arousal for the organism. This state can be characterized by inhibition of activity, including motoric activity, attentive behavior, and specific physiological responses. This arousal precedes the specific affective response; it is not part of the affective tone. The specific affective

response is determined by the specific consequences of this arousal. In one theoretical scheme, it is related to the degree to which an infant can assimilate the arousing event (Kagan, 1974). Unfortunately, our data do not support such a view. The midget is clearly the most unassimilable social event, yet elicits little fear--certainly less than the normal-sized female adult stranger (Brooks & Lewis, 1975). In another scheme, the affect response is related to the specific cognition, needs and plans the organism has at the time of the arousing event (Lewis & Brooks, 1974). Notice that in either scheme, the function of discrepancy is to arouse the organism, and arousal, though insufficient in itself, may lead to the specific affective response.

It is most interesting to note that both the presence of a schema, as in the case of cognitively mediated or learned fear, and its absence, in the case of incongruity, have been hypothesized as affect producing. This should signify to us that the specific affective response is the result of a complex and poorly understood process involving the organism's status and its cognition, plans, and strategies, as well as the stimulus properties and the contextual elements. Not until we are capable of incorporating these many elements will we understand the phenomena that are termed fear.

A version of this paper appears as the introduction in M. Lewis & L. Rosenblum (Eds.), The origins of fear: The origins of behavior, Volume II. New York: Wiley, 1974.

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